Mangrove Reed Warbler *Acrocephalus scirpaceus avicenniae* at the Red Sea in Egypt

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La Rousserolle des mangroves *Acrocephalus scirpaceus avicenniae* à la Mer rouge en Égypte. En avril 2012, nous avons découvert la Rousserolle des mangroves *Acrocephalus scirpaceus avicenniae* sur la côte de la Mer rouge près de Hamata, au sud de l'Égypte. C'était la première mention de cette sous-espèce pour le Paléarctique occidental. Lors d'inventaires supplémentaires les années suivantes, nous avons observé des Rousserolles des mangroves en train de nicher. En plus des caractéristiques morphologiques et génétiques, nous avons collecté des données concernant l'habitat, la reproduction (y compris la première description de nids conservés naturellement par le sel), l'abondance, les autres espèces présentes et les menaces auxquelles la population est confrontée. En juillet–août 2015 nous avons trouvé des individus dans les mangroves de Shura Al-Rowaisseya, sur la péninsule du Sinaï. Il est recommandé de mener des recherches supplémentaires sur ce taxon afin de préciser sa distribution, son écologie de reproduction et son statut migratoire.

Summary. In April 2012, we discovered Mangrove Reed Warbler *Acrocephalus scirpaceus avicenniae* at the Red Sea coast near Hamata, in southern Egypt. This was the first record of this subspecies for the Western Palearctic. During additional surveys in subsequent years, we also observed breeding Mangrove Reed Warblers. In addition to morphological and genetic data, we collected information on breeding habitat, breeding biology (including the first description of salt-preserved nests), abundance, other species present and population threats. In July–August 2015 we found *A. s. avicenniae* in the mangroves of Shura Al-Rowaisseya, on the Sinai Peninsula. Further research on this taxon is recommended to clarify its distribution, breeding ecology and migratory status.

In recent years, new insights into genetic relations within the Eurasian Reed Warbler complex *Acrocephalus scirpaceus* have been obtained as a result of intensive field and laboratory work (e.g. Leisler *et al.* 1997, Fregin *et al.* 2009, Winkler *et al.* 2012, Olsson *et al.* 2016). We have previously studied the different *Acrocephalus* taxa found in Libya and Egypt (Hering *et al.* 2009, 2010a,b, 2011a,b), including the description of a new subspecies, Siwa Reed Warbler *A. s. ammon* (Hering *et al.* 2016). In April 2012, we recorded Mangrove Reed Warbler *A. s. avicenniae* for the first time on the Red Sea, near Hamata in southern Egypt (Hering *et al.* 2012a,b). This also was the first record for the Western Palearctic. Until then, this taxon, which according to recent genetic studies forms a clade with the eastern Reed Warbler subspecies *A. s. fuscus* (Leisler *et al.* 1997, Fregin *et al.* 2009, Winkler *et al.* in prep.), was known to breed only in the mangroves of Sudan, Eritrea, northern Somalia and the south-western Arabian Peninsula (Ash *et al.* 1989, Pearson 1997, Meadows 1999, Dyrcz 2006). In addition to genetic and morphological data, we collected information on the breeding habitat and abundance of the Mangrove Reed Warbler in southern Egypt. However, the search for freshly built nests in 2012 was unsuccessful. Instead, we found old nests that were frequently encrusted with salt. In July 2013, in Wadi el-Gemal National Park, we again studied this reed warbler taxon, which appears to be closely tied to saltwater habitats. We found occupied nests and observed a recently fledged juvenile (Hering *et al.* 2013). During surveys of suitable habitat further north, in July–August 2015, we finally recorded an individual of the same subspecies in the mangroves of Shura Al-Rowaisseya on the Sinai Peninsula. The present paper summarises all recent records of Mangrove Reed Warbler in Egypt and provides information on its breeding biology.

Methods

The first Mangrove Reed Warbler was recorded during an expedition funded by the Deutsche Ornithologen-Gesellschaft (DO-G) between 18 April and 6 May 2012 that included visits to Wadi el-Gemal National Park in southern Egypt, on the Red Sea, on 24–28 April and 4 May (JH, EF, WH, H-JE). Subsequent surveys of this area and of the more southerly mangroves of Mersa El-Hamira were made on 25–30 May (JH, PHB, H-JE).

Additional field work was undertaken on 8–16 July 2013 at Wadi el-Gemal National Park and in the northerly mangroves of Sharm El-Qebli, Sharm El-Bahari, Wadi Abu Hamra and South Safaga (JH, EF, K. Müller). Our investigations were permitted and supported by the Wadi el-Gemal National Park administration. A short survey of the mangroves in Sinai was carried out on 30–31 December 2013 (JH, H. Hering). Final surveys took place on 30 July–5 August 2015 on the island of Abu Minkar, in Wadi Abu Hamra, and in the mangroves of Shura Al-Rowaisseya and Shura Al-Manquata, all in Sinai (JH, H-JE, WH, M. Habib, A. Heim).

Birds were captured using mist-nets together with tape lures playing the songs of Eurasian and African Reed Warblers (recordings by Chappuis 2000, Schulze 2003) as well as our own recordings of the local reed warblers. Ringing and biometric measurements followed the current standard methods of the DO-G (2011). Two Mangrove Reed Warblers caught in Wadi Lahami on 28 April 2012 and six caught in July 2013 were fitted with rings from Helgoland Bird Observatory (Helgoland, Germany).

Blood samples were taken from nine Mangrove Reed Warblers for molecular comparison with sampled Siwa Reed Warblers (Hering *et al.* 2011a, 2016). Two samples from Wadi Lahami were sequenced at the Konrad Lorenz Institute of Ethology, Vienna, Austria, in the course of our study on *A. s. ammon* (Hering *et al.* 2016); resources for sequencing more samples were limited at that time. A section of the cytochrome *b* gene was obtained from both samples. There were no differences between these two sequences. In addition, the control region II of the mitochondrial genome (Singh *et al.* 2008) was successfully sequenced for one sample, whereas the analysis of the second one failed.

Reference samples used in comparative molecular analyses stemmed from specimens sampled near Lake Neusiedl, Austria, and, for *A. s. avicenniae* and *A. s. fuscus*, were provided by S. Fregin (*cf.* Leisler *et al.* 1997, Fregin *et al.* 2009) and for *A. baeticatus guiersi* (Senegal) and *A. s. scirpaceus* (Lake Constance, Germany) by V. Salewski.

A digital audio recorder (Swissonic MDR 2) was used to record bird songs and calls. Recordings were made in uncompressed WAV format with 44.1 kHz sampling frequency and 16-bit resolution, and were analysed at the Museum für Naturkunde, Leibniz Institute for Evolution and Biodiversity Science, Humboldt-Universität Berlin, Germany, using the Avisoft SASLab Pro (version 5.0.14) software. Acoustic documentation of Mangrove Reed Warblers made during this study can be accessed online at www.tierstimmenarchiv.de (files: TSA:Acrocephalus_scirpaceus_DIG_154_6_1, _DIG_154_7_1, and _DIG0164_23 to _DIG0164_25).

Study area

We documented Mangrove Reed Warblers in two areas of Wadi el-Gemal National Park. With 7,450 km² the area represents the third largest national park in Egypt and is characterised mostly by mountainous desert terrain (Eastern Desert) and a *c.*110 km-long and on average 15 km-wide coastal zone (*cf.* Baha El Din 1998, 2003, Samy *et al.* 2011). The offshore islands of Qulân and Wadi Gimal are designated as Important Bird Areas (Baha El Din 2001). A further observation was made on 8 August 2015 in the mangroves of Shura Al-Rowaisseya. This area is one of a total of five mangrove stands in the south-east Sinai Peninsula (PERSGA 2004). The mangroves of Shura Al-Rowaisseya form part of Nabq Protected Area (*cf.* Al-Mufti 2000, Baha El Din 2001).

Those mangroves surveyed by us unsuccessfully for *A. s. avicenniae* along the Red Sea coast in Egypt are as follows: Marsa Hemira, Sharm El-Qebli, Sharm El-Bahari, Wadi Abu Hamra, South Safaga, the island of Abu Minkar near Hurghada, and Shura Al-Gharqana, Mersa Abu Zabad, and Shura Al-Manquata in Sinai. The mangroves on the island of Safaga, which lie within a restricted military area, were inaccessible (*cf.* PERSGA 2004).

Mangrove Reed Warblers recorded in coastal habitats of the Red Sea were observed in both closed-canopy and partially open, shrubby mangrove vegetation. The following descriptions of the studied mangroves are based on our own observations and on information from PERSGA (2004). Fig. 1 shows those sites around the Red Sea and Gulf of Aden where Mangrove Reed Warblers were previously known to occur, and the newly documented sites in Egypt.

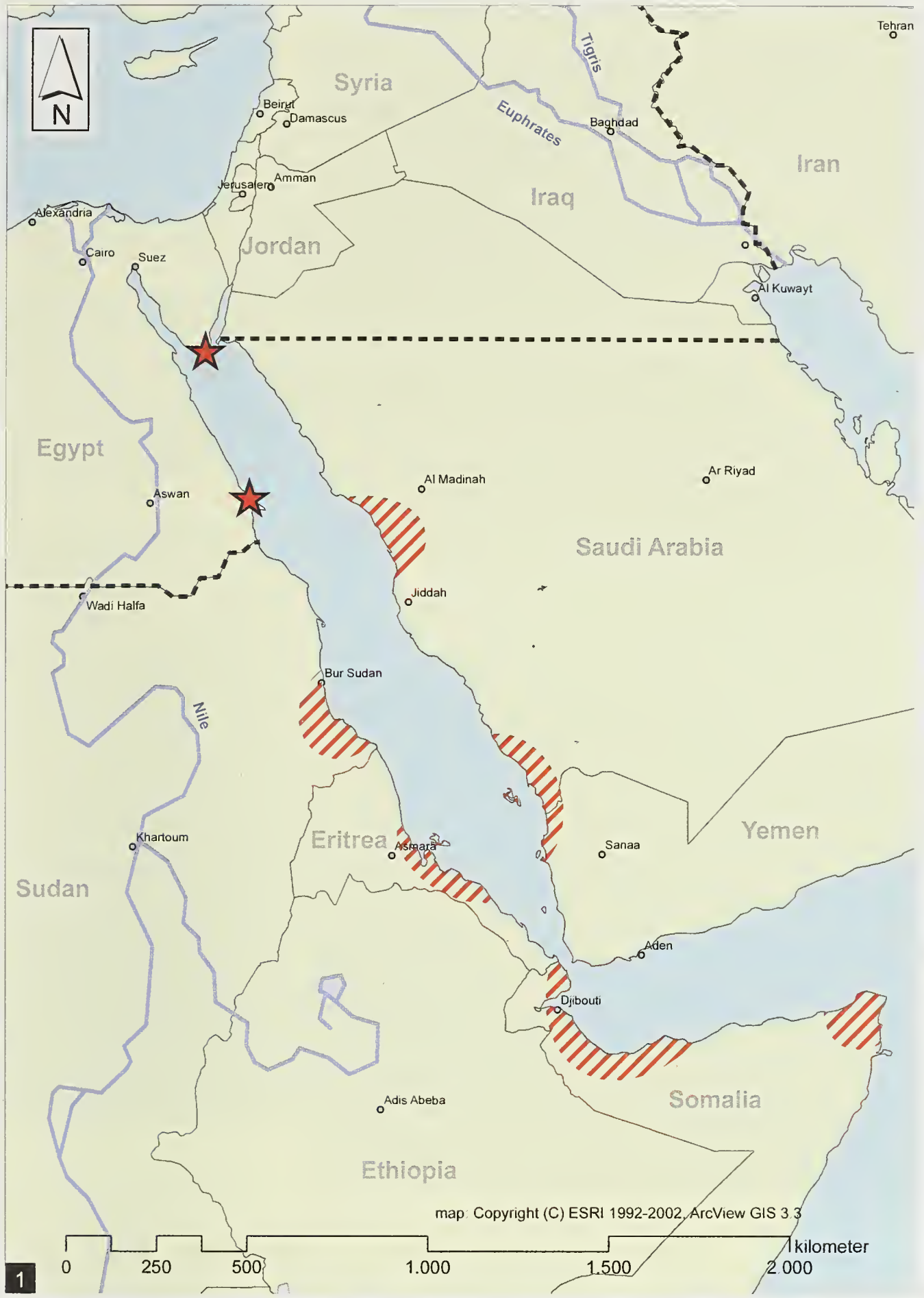

Figure 1. Distribution of Mangrove Reed Warbler *Acrocephalus scirpaceus avicenniae* and newly discovered sites (red stars) in Egypt; broken line: boundary of the Western Palearctic *sensu* Cramp & Simmons (1977).

Distribution de la Rousserolle des mangroves *Acrocephalus scirpaceus avicenniae* et nouveaux sites découverts (étoiles rouges) en Égypte ; ligne pointillée : limites du Paléarctique occidental *sensu* Cramp & Simmons (1977).

Figure 2. The mangroves of Wadi Lahami, Egypt, April 2012; Mangrove Reed Warbler *Acrocephalus scirpaceus avicenniae* prefers the low vegetation at the edge (Jens Hering)

Les mangroves de Wadi Lahami, Égypte, avril 2012 ; la Rousserolle des mangroves *Acrocephalus scirpaceus avicenniae* préfère la végétation basse au bord (Jens Hering)

Figure 3. Low-growing, largely closed-canopy Grey Mangroves *Avicennia marina* in Wadi Lahami, Egypt, April 2012 (Jens Hering)

Mangrove basse et principalement fermée constituée de Palétuviers gris *Avicennia marina* à Wadi Lahami, Égypte, avril 2012 (Jens Hering)

Figure 4. Partly open Grey Mangroves *Avicennia marina* in which significant densities of Mangrove Reed Warblers *Acrocephalus scirpaceus avicenniae* and Eastern Olivaceous Warblers *Iduna pallida alulensis* were detected, Hamata, Egypt, July 2013 (Jens Hering)

Mangrove partiellement ouverte constituée de Palétuviers gris *Avicennia marina* dans laquelle on a enregistré des densities importantes de la Rousserolle des mangroves *Acrocephalus scirpaceus avicenniae* et de l'Hypolaïs pâle *Iduna pallida alulensis*, Hamata, Égypte, juillet 2013 (Jens Hering)

Wadi Lahami

Coordinates: 24°13'20.06"N 35°25'2.72"E (Figs. 2–3); *c.*32 ha (length 1,500 m, max. width *c.*400 m), located in a bay and formed by stands of Grey Mangrove *Avicennia marina* as in other mangroves on the Red Sea in Egypt (Loop-root Mangrove *Rhizophora mucronata* occurs naturally only near the Egypt / Sudan border); mean height 2.8 m, max. height 5.6 m in the east of the area; lower shrubby vegetation is conspicuous in the north-eastern part. The area is characterised by a closed lagoon surrounded completely by mangroves and two smaller lagoons that open into the sea. A campsite lies almost directly adjacent to the south. The northern boundary is formed by a hotel under construction (see Population threats). On the landward side, the mangroves are restricted by salt flats, which are sparsely vegetated with halophytes.

Up to five singing Mangrove Reed Warblers were detected on 26–28 April 2012 and up to 16 on 25–30 May 2012. Five singing individuals and a breeding pair with one fledgling were observed on 8–16 July 2013. On 15 July 2013, a recent nest, from which young had fledged, was collected. Preferred nesting sites were at low to medium height in dense mangroves at the western edge of the area. Five birds were caught in natural clearings in up to 2.5 m-high bushes in the west of the area (two on 28 April 2012 and singles on 8, 13 and 14 July 2013).

Figure 5. Low-growing mangroves in Shura Al-Rowaisseya—the trapping site of a first-year Mangrove Reed Warbler *Acrocephalus scirpaceus avicenniae*, Sinai, Egypt, August 2015 (Jens Hering)

Mangroves basses dans la zone de Shura Al-Rowaisseya – le site de capture d'une Rousserolle des mangroves *Acrocephalus scirpaceus avicenniae* de première année, Sinaï, Égypte, août 2015 (Jens Hering)

Figure 6. Mangrove Reed Warbler *Acrocephalus scirpaceus avicenniae* is difficult to see in dense mangroves, Wadi Lahami, Egypt, April 2012 (Jens Hering)

La Rousserolle des mangroves *Acrocephalus scirpaceus avicenniae* est difficile à détecter dans les mangroves denses, Wadi Lahami, Égypte, avril 2012 (Jens Hering)

Hamata Mangroves

Coordinates: 24°18'36.99"N 35°21'41.97"E (Fig. 4); consists of four relatively large mangrove stands at the outlets of the wadis of Mastura, Al-Qulaan, Rawada Al-Edaiah and Harbiyyah; mean height 2.8 m, max. height 5.5 m. On the landward side, the mangroves are mostly surrounded by desert.

On 29 May 2012 four singing individuals were detected and on 8–16 July 2013 max. 6 singing individuals were present. We also found a nest with three eggs on a mangrove island on 15 July 2013. On 16 July 2013 three Mangrove Reed Warblers were caught here.

Marsa Hemira Mangroves

Coordinates: 23°28'47.87"N 35°29'20.09"E; *c.*9.2 ha (length *c.*2,000 m), located in a restricted military area within a long bay; mean height 3.0 m, max. height 5.8 m. The mangroves are bordered by a military base to the south and by desert terrain elsewhere.

We heard two singing Mangrove Reed Warblers during a short visit on 28 May 2012.

Shura Al-Rowaisseya

Coordinates: 28°10'51.69"N 34°26'45.25"E (Fig. 5); the largest mangrove on the Sinai Peninsula, 27.6 ha (length 3 km); lowest mangroves up to 1.5 m on the landward side, max. height 5–6 m in the central zone, particularly around a lagoon and subtidal pools. At the north-east side of the mangrove is a small café run by Bedouins.

On 4 August 2015 we caught a first calendar-year Mangrove Reed Warbler in a natural clearing within low mangroves.

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Identification criteria and vocalisations

Nine Mangrove Reed Warblers were caught, measured and genetically sampled. All trapped and observed individuals had conspicuously short, rounded wings (length 58.5–62.5 mm, mean 59.7 mm), and adults had heavily worn plumage. Compared to migrating Reed Warblers (*A. s. scirpaceus* and *A. s. fuscus*) and the closely related taxon from Siwa, the Mangrove Reed Warblers had a dark brownish-grey plumage similar to that of *A. s. fuscus*. A juvenile, caught in August 2015, had fresh plumage, tongue spots and visible gape flanges. The trapped individuals were clearly identified as *A. s. avicenniae*, based on the biometric characteristics established by Ash *et al.* (1989) and further described in Kennerley & Pearson (2010). Molecular analysis of the mitochondrial control region II and the cytochrome *b* gene permitted clear assignment to *A. s. avicenniae*. Both sequence types also confirmed the close relationship of *A. s. avicenniae* to *A. s. fuscus* and *A. s. ammon* (see Hering *et al.* 2011a, 2016).

Figs. 6–9 show this hitherto rarely described Eurasian Reed Warbler subspecies in the field and in the hand (but see Porter & Stanton 2011, Hering *et al.* 2012b, Hering *et al.* 2013).

Mangrove Reed Warbler song is very similar to that of other Eurasian Reed Warbler subspecies and to African Reed Warbler *A. baeticatus*. However, like *A. s. ammon*, the frequency of the individual song elements appears to be lower than in Eurasian Reed Warbler (*cf.* G. Nikolaus *in* Leisler *et al.* 1997, Hering *et al.* 2016). Comparative sonograms demonstrate that the song of *A. s. avicenniae* and that of the birds from Siwa differs from that of *A. s. scirpaceus* (Hering *et al.* 2011a). This difference, however, was not evident for calls and distress calls, which resembled those of nominate Eurasian Reed Warbler and African Reed Warbler. Full song was registered at the study areas in southern Egypt in April, May and July. In some places, several individuals sang simultaneously within just a few square metres. It merits reporting that some singing Mangrove Reed Warblers neither reacted to playback of their own taxon's song nor to recordings of *A. s. scirpaceus*.

Figures on facing page

Figure 7. Singing Mangrove Reed Warbler *Acrocephalus scirpaceus avicenniae*, Wadi Lahami, Egypt, July 2013 (Jens Hering)

Rousserolle des mangroves *Acrocephalus scirpaceus avicenniae* en train de chanter, Wadi Lahami, Égypte, juillet 2013 (Jens Hering)

Figure 8. Adult Mangrove Reed Warbler *Acrocephalus scirpaceus avicenniae*, Wadi Lahami, Egypt, April 2012 (Jens Hering)

Rousserolle des mangroves *Acrocephalus scirpaceus avicenniae* adulte, Wadi Lahami, Égypte, avril 2012 (Jens Hering)

Figure 9. Primary projection of *A. s. avicenniae* (top) compared to *A. s. scirpaceus*, Wadi Lahami, Egypt, April 2012 (Jens Hering)

Projection des primaires de *A. s. avicenniae* (en haut) comparée à celle de *A. s. scirpaceus*, Wadi Lahami, Égypte, avril 2012 (Jens Hering)

Habitat and breeding biology

The Mangrove Reed Warblers observed in Egypt occurred predominantly in closed-canopy (to some extent also in open) low-growing Grey Mangrove. Above heights of *c.*3 m, the mangrove-specialist subspecies of Eastern Olivaceous Warbler *Iduna pallida alulensis*, recently discovered in Egypt (Baha El Din *et al.* 2010), prevailed. Direct interspecific neighbourhood and habitat overlap were occasionally documented.

After failing to find active nests in Wadi Lahami and near Hamata in April and May 2012, we found two nests in July 2013, both in dense mangroves *c.*3 m tall: one contained three eggs (Fig. 10) while the other was fresh but without eggs. In addition, we observed a recently fledged juvenile (Fig. 12). This indicates that the peak breeding season occurs around July with its extreme temperatures of 40–50°C. This accords with findings from Saudi Arabia, where fledglings have been observed in July (Jennings *et al.* 1987, Jennings 1995). Active nests had not been described for *A. s. avicenniae* (e.g. Kennerley & Pearson 2010). It is noticeable that Mangrove Reed Warbler constructs sturdy, tightly woven nests, while Eastern Olivaceous Warbler nests are more loosely bound (Figs. 10–14). In addition to the two active nests, we found numerous nests from the previous season or years, which could no longer be assigned to species. The nests built in the middle of the mangroves (n = 52) were all 1.0–2.1 m above the ground and attached to twigs or sited on a forked branch. Nest material consisted entirely of fibres of rotten mangrove wood or

Figure 10. Nest and eggs of Mangrove Reed Warbler *Acrocephalus scirpaceus avicenniae*; the whitish ground colour of the eggs differs from the brown-greenish tones of *A. s. scirpaceus* eggs, these eggs are more similar to those of *A. palustris*, Hamata, Egypt, July 2013 (Jens Hering)

Nid et œufs de la Rousserolle des mangroves *Acrocephalus scirpaceus avicenniae* ; la couleur de fond blanchâtre des œufs diffère des tons bruns-verts des œufs de *A. s. scirpaceus*, ces œufs-ci ressemblent plutôt à ceux de *A. palustris* ; Hamata, Égypte, juillet 2013 (Jens Hering)

Figure 11. Active nest of Mangrove Reed Warbler *Acrocephalus scirpaceus avicenniae*, Wadi Lahami, Egypt, July 2013 (Jens Hering)

Nid occupé de la Rousserolle des mangroves *Acrocephalus scirpaceus avicenniae*, Wadi Lahami, Égypte, juillet 2013 (Jens Hering)

Figure 12. Recently fledged Mangrove Reed Warbler *Acrocephalus scirpaceus avicenniae*, Wadi Lahami, Egypt, July 2013 (Jens Hering)

Jeune Rousserolle des mangroves *Acrocephalus scirpaceus avicenniae* à peine sortie du nid, Wadi Lahami, Égypte, juillet 2013 (Jens Hering)

mangrove bast fibres. A special feature is the continuous excretion of salt from the mangroves, which prevents the nests from disintegrating post-breeding (Figs. 15–16). Over time, an increasingly thick salt crust covers the nests until they are virtually fossilised. Such 'naturally conserved' songbird nests were hitherto unknown. However, differentiating such older Acrocephalidae nests to species was impossible. We collected several nests for detailed analyses, e.g. to clarify how and why salt crusts form (Fig. 17). Atomic spectroscopy and X-ray analysis demonstrated that the encrusted nest material contains mostly halite (NaCl). Thus, sea salt crystallises on the nests and forms the salt crusts (Hering *et al.* 2013).

Both fresh Mangrove Reed Warbler nests were found near 'naturally conserved' nests. This was also the case for Eastern Olivaceous Warbler nests. Perhaps these old visible nests indicate breeding habitat quality, possibly signalling nest sites with lower predation risk, and attract potential breeders, as is known in, e.g., European Penduline Tit *Remiz pendulinus* (Flade & Franz 1993). In any case, the unequal distribution of nests in loose aggregations within the mangroves is conspicuous (Fig. 18). Loose nest aggregations are regularly observed in Acrocephalidae (Leisler & Schulze-Hagen 2011).

Figures 13–14. Active nest of Eastern Olivaceous Warbler *Iduna pallida alulensis*, Wadi Lahami, Egypt, July 2013 (Jens Hering)

Nid occupé de l'Hypolaïs pâle *Iduna pallida alulensis*, Wadi Lahami, Égypte, juillet 2013 (Jens Hering)

Figure 15. Presumably one-year-old Acrocephalidae nest, Wadi Lahami, Egypt, April 2012 (Jens Hering)

Nid d'Acrocephalidé, probablement de l'année précédente, Wadi Lahami, Égypte, avril 2012 (Jens Hering)

Figure 16. Salt-encrusted Acrocephalidae nest, presumably several years old, Wadi Lahami, Egypt, May 2012 (Jens Hering)

Nid d'Acrocephalidé incrusté de sel et vieux de probablement plusieurs années, Wadi Lahami, Égypte, mai 2012 (Jens Hering)

Accompanying species

The following additional breeding (B) or probably breeding (pB) bird species in mangroves were documented during our surveys: Striated Heron *Butorides striata* (B), Western Reef Heron *Egretta gularis* (B), Goliath Heron *Ardea goliath* (pB), Yellow Bittern *Ixobrychus sinensis* (B; Hering *et al.* 2012c), Osprey *Pandion haliaetus* (B), Kentish Plover *Charadrius alexandrinus* (B), Eurasian Collared Dove *Streptopelia decaocto* (B; Hering & Heim 2015), African Collared Dove *S. roseogrisea* (pB), Laughing Dove *Spilopelia senegalensis* (B), Namaqua Dove *Oena capensis* (B; Hering *et al.*

Figure 17. Fresh and 'naturally conserved' Acrocephalidae nests from the mangroves of Hamata and Wadi Lahami, Egypt, July 2013 (Jens Hering)

Nids récents et 'conservés naturellement' d'Acrocephalidés des mangroves de Hamata et Wadi Lahami, Égypte, juillet 2013 (Jens Hering)

Figure 18. Aggregation of nests in a mangrove: fresh nest of Eastern Olivaceous Warbler *Iduna pallida alulensis* (left) next to a one-year-old nest (bottom right) and probably a several-years-old nest (top right), Wadi Lahami, Egypt, July 2013 (Jens Hering)

Groupe de nids dans la mangrove : nid recent d'Hypolaïs pâle *Iduna pallida alulensis* (à gauche) près d'un nid d'un an (en bas à droite) et d'un autre vieux de probablement plusieurs années (en haut à droite), Wadi Lahami, Égypte, juillet 2013 (Jens Hering)

2015a) and Eastern Olivaceous Warbler *Iduna pallida alulensis* (B; Hering *et al.* in prep.).

Population threats

Potential predators of eggs, nestlings or fully grown Mangrove Reed Warblers include Striated Heron and Yellow Bittern, which inhabit low and dense mangroves. According to our own observations and to information provided by employees of the national park, reptiles do not occur in the studied areas. Mice may play a potential role as nest predators, as assumed for Namaqua Dove (*cf.* Hering *et al.* 2015a).

A major threat to the Egyptian coast mangroves are free-ranging Dromedaries *Camelus dromedarius*, which feed on leaves and shoots, thereby permanently damaging the mangroves (PERSGA 2004). We repeatedly observed grazing animals in the Wadi Lahami mangroves (Fig. 19). Moreover, the growth in tourism and the associated construction of hotel complexes have major impacts. This is evident in the Wadi Lahami area, which is bordered by a bungalow settlement with a scuba-diving school in the south and an unfinished hotel complex (prohibited by the

Figure 19. Dromedaries *Camelus dromedarius* at the mangroves of Wadi Lahami, Egypt, April 2012 (Jens Hering)

Dromadaires *Camelus dromedarius* au bord des mangroves de Wadi Lahami, Égypte, avril 2012 (Jens Hering)

Figure 20. Hotel under construction at the northern edge of the mangroves of Wadi Lahami, Egypt, May 2012 (Jens Hering)

Hôtel inachevé à la limite nord des mangroves de Wadi Lahami, Égypte, mai 2012 (Jens Hering)

national park administration) in the north (Fig. 20), as well as by a nearby luxury hotel. Apart from the discharge of waste water, disturbance by hotel guests is problematic. We met tourists several times at low tide, also in the mangroves. Even now, mangrove wood is used by locals for charcoal production or as firewood and timber. Finally, floating debris and discarded plastic waste is a major problem (*cf.* Baha El Din 2003, PERSGA 2003, 2004). We found significant quantities of coloured plastic string in the nests of Ospreys, herons, doves and Acrocephalidae. A positive development in recent years is the noticeable conservation effort, especially the designation of national parks. Conservation activities around the Hamata mangroves include nursery plantations, accompanying scientific studies, public awareness campaigns, etc. (e.g. Baha El Din 2003, Kholeif 2007, Samy *et al.* 2011). It is worth mentioning that all Mangrove Reed Warblers were observed in areas already protected.

Discussion

Our investigations show that Mangrove Reed Warbler is a regular breeder in southern Egypt within sufficiently large and low-growing mangroves. It is very likely, however, that this subspecies breeds only sporadically in the more northerly mangroves of the Red Sea, although our record of a first calendar-year bird in suitable habitat indicates that *A. s. avicenniae* may even breed on the Sinai Peninsula. Further surveys of this region, as well as in mangroves of the Arabian Peninsula along the Red Sea coast, are required to clarify this taxon's distribution. Lack of knowledge of the distribution of Mangrove Reed Warbler along the Arabian coast is confirmed by Meadows (1999), Jennings (2010) and Porter & Stanton (2011). A first dedicated search for *A. s. avicenniae* in suitable habitat beyond the Red Sea, in Oman (Mahawt Island, Liwa) was made unsuccessfully in 2015/16 (J. Hering). In contrast, Mangrove Reed Warblers were observed frequently in a mangrove forest in Djibouti, which represented the first

record of the subspecies in this country (Hering *et al.* 2015b). Both findings suggest that *A. s. avicenniae* is endemic to coasts of the Red Sea and the Gulf of Aden.

The Red Sea coast south of Marsa Alam in Egypt is particularly attractive to birdwatchers, being the only part of Cramp's Western Palearctic where species such as Goliath Heron, Crab-plover *Dromas ardeola* and Lappet-faced Vulture *Torgos tracheliotos* are regularly observed. But why did the Mangrove Reed Warbler remained undiscovered for so long, despite searches for these largely Afrotropical species? It seems clear that no attention was previously paid to *A. s. avicenniae*, because singing reed warblers were generally classified as *A. s. scirpaceus* or *A. s. fuscus*, which stop-over in large numbers on spring migration. It is worth mentioning that another bird species in the mangroves of southern Egypt, Yellow Bittern, went undiscovered until we recorded it as a breeding bird for the first time in the Western Palearctic and Africa (Barthel & Hering 2012, Hering *et al.* 2012c).

The results of our study call for further research into the distribution, abundance, density, breeding biology and behavioural ecology of the Mangrove Reed Warbler. For example, it is currently unknown whether *A. s. avicenniae* is a year-round resident or a short-distance migrant.

Acknowledgements

We thank Mohamed Habib, Arend Heim, Heidi Hering and Klaus Müller for field assistance, as well as the Wadi el-Gemal National Park administration, in particular Saied Noby and Mohamed Negm, for permission and technical support of our field work. Wouter van Dongen ran the genetic analysis. Carl Zeiss Sports Optics kindly provided optical equipment. Panasonic provided an Outdoor-Notebook for the expedition in 2012, which was funded by the Deutsche Ornithologen-Gesellschaft. Also, many thanks to Timothy Coppack for translating the manuscript. Finally, we thank Peter Becker, Gerd Fanghänel, Karl-Heinz Frommolt, Olaf Geiter, Gudrun Hilgerloh, Haitham Ibrahim, Thomas Kraft, Bernd Leisler, Jochen Martens, István Moldován, Dieter Saemann, Karl Schulze-Hagen, Niels Sigmund and Till Töpfer for their support. David Pearson, Karl Schulze-Hagen and Guy Kirwan made useful comments on the submitted version of this paper.

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Received 4 September 2016; revision accepted 17 January 2017.